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Invention: **ARRANGEMENT FOR WIRELESS COMMUNICATIONS**

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This is a:

- ☐ Provisional Application
- ☐ Regular Utility Application
- ☐ Continuing Application
 - ☒ The contents of the parent are incorporated by reference
- ☐ PCT National Phase Application
- ☐ Design Application
- ☐ Reissue Application
- ☐ Plant Application
- ☒ Substitute Specification
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SPECIFICATION

ARRANGEMENT FOR WIRELESS COMMUNICATIONS



FIELD OF INVENTION

The present invention relates to a wireless communications system and apparatus. More specifically, the invention relates to wireless communication system and apparatus which relieves a connected host unit from context switching procedures, unnecessary processing of disturbance and interference signals, and work-demanding interruption routines in the direct wireless exchange of information between host units via arrangements in accordance with the invention.

DESCRIPTION OF THE BACKGROUND ART

Known arrangements for wireless communications with direct signal transmission between communications units such as PCs or other host computers, printers, facsimile equipment or other communications units, include equipment for the direct wireless transmission of data, for instance IR equipment, radio equipment or ultrasonic equipment. The direct signal transmission between communication units is achieved without the use of intermediate active transmission systems, such as, for example, mobile telephone systems, which receive and process the signals from one unit and relays the signals to another unit. The equipment for the direct transmission of data is, in turn, controlled and operated by communications protocol, error correcting routines and possibly routines for signal disturbance filtration of wireless transmitted signals. These routines and protocols present within the communications units.

It will be understood that, a mobile telephone system is not accessible for the transmission of information between, for example, arrangements where communications are often instantaneous with large quantities of data, requiring high speeds. In such cases, it

would untenable to expect access to a mobile telephone system for transmission purposes. Often no unoccupied channels are available and the mobile telephone traffic varies throughout a calendar day.

Protocol, routines, and hardware integrated in communications units for wireless transmission require a high degree of computer power, which steals memory space and time for other processing in communications units. Received signals may often require conversions to an ASCII code or other standard alphanumerical character codes with control characters.

Furthermore, the receiver portion of communications units with integrated wireless communication capabilities operates continuously in the presence of external disturbances, interference signals, and noise. As such, the communications unit or host unit operates continuously and unnecessarily in the presence of such noise, even though such signals may be detected as noise. Sources of such disturbances and noise may, for instance, consist of the remote controls of other apparatus, such as TV apparatus, lighting controls, cordless telephones, etc.

The aforesaid circumstances, constitute a problem is existing known wireless communication apparatus or systems with respect to rapid and effective transmission of information.

SUMMARY OF THE INVENTION

It is an object of the present ^{invention} ~~invention~~ to provide ^{an} ~~an~~ effective solution to the aforesaid * problem with regard to the rapidness and effectiveness of direct communication between communication units in the absence of processing via intermediate, active link systems which forward signals in the digital transmission of data between communications traits ?

A first alternative embodiment of the invention involves using means ^{for} ~~fur~~ signal conversion in the arrangement solely for filtering disturbances in received wireless-transmitted signals (pulses), wherein communications protocol is included in the host unit to which the arrangement is connected.

In a second alternative embodiment of the invention, there is provided a separate external arrangement which in wireless transmission perform all signal processing externally of a host unit, wherein only signals between the host unit and the inventive arrangement are transmitted in the form of alphanumeric codes with control characters, preferably binary characters.

An object of the invention is also to connect an inventive arrangement to a host unit via standard host unit input and output ports.

Yet another object of the Invention is to enable a host unit connected to an inventive arrangement to maintain communication between other external units in a conventional manner, for instance via local network connections through the medium of connection means, therewith enabling the ~~wireless~~ ^{less} transmission to be applied without disturbing ~~or~~ ^{if} delaying other communication, when applicable.

The objects of the invention [?] are achieved with an arrangement for wireless communication having inbuilt integrated electronics and being connected to a host unit via connection means.

The arrangement includes process-controlled integrated electronics with transmitter means and receiver means, said means functioning to establish a direct transmission link with other means for wireless pulse transmission and wireless pulse reception respectively, means for filtering out disturbance data and noise, signal conversion means, and input and output ports for connection to the host unit through the medium of connection mean. The arrangement including said filter means operates as a buffer to the host unit, inasmuch that,

the host unit receives and processes via said connection means solely data intended for the host unit. *

In one embodiment of the invention, the arrangement may include protocol control means for transmitting and receiving data between integrating devices ~~anti~~ between the host unit, wherein the arrangement converts received wireless-transmitted data to an alphanumeric character code optionally with control characters for transmission [?] to tie host [?] unit, or converts alphanumeric character codes received from the host unit and [?] possibly including control characters to pulses for wireless transmission. The arrangement thus operates autonomously from the host-unit concerned with regard to wireless transmission and its signal conversion. †

When a host unit has an inventive arrangement connected thereto, the unit will use the arrangement on an intermittent basis and other existing network connections continuously, or, alternatively, the unit will determine when and to which extent the arrangement is used in relation to other existing network connections.

Alternatively, the arrangement may constitute the sole communication path of a host unit for external communication.

It is preferred that the arrangement is portable when not integrated in a host unit, and that the arrangement ^{can} ~~can~~ be connected to a host unit via standard I/O ports of said unit and said arrangement without needing to supplement the host unit with wireless communication software.

BRIEF DESCRIPTION OF THE DRAWING

The present invention will now be described in more detail with reference to the accompanying drawing, in which Fig. 1 illustrates schematically a communications link for the wireless transmission of digital data with an inventive arrangement in the form of a black box; and

Fig. 2 is a block schematic illustrating a communications link for the wireless transmission of digital data in accordance with the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

With the intention of solving the aforesaid problems and achieving the aforesaid objects by means of the present invention, and apparatus and system are presented, which operate completely or partially external to host communications units, as described below.

In this regard, Fig. 1 illustrates schematically a communication link 9 for the direct wireless transmission of digital data, having two inventive apparatuses 12 in the form of black boxes connected to a host unit 10 through a connection mechanism. In the illustrated case, the connection mechanism comprises a data cable 14.

It is to be noted that, direct transmission as used herein, indicates that there are no intermediate active systems that receive transmitted signals and forward the signals to the intended receivers. In other words, the communication apparatuses directly communicate with each other across a direct communications channel established therebetween. Active systems, such as mobile telephone systems, involve the transmission of data via intermediate systems, such as base stations and switching centres for forwarding signals to the receiver, which also involves incurring extra costs for using the mobile telephone system. The present invention relates, for example, to two computers which are often located at a relatively short distance apart and which directly communicate with each other, often in the same room. As a result, communication between the computers via an active intermediate system or an active intermediate link would only incur unnecessary costs in respect of equipment, subscription fees, etc., and considerably higher loading of the active system, which often has a limited number of channels. Thus, the transmitter and receiver mechanisms in the communication apparatuses of the present invention establish an individual direct communications link which

can use passive reflectors for transmission, e.g. walls, ceilings, roofs, parabolic reflectors, mirrors, etc. The present invention provides practically immediate access to a data transmission, particularly when the access times are compared with the access times applicable in mobile telephone systems. It will be understood that a mobile telephone system is not accessible for the transmission of information between, e.g., devices where communication may often take place instantaneously and with large quantities of data and at high speeds. It would be untenable to expect access to a mobile telephone system for transmission purposes. Often, no unoccupied channels are available and the traffic over mobile telephone systems varies throughout a calendar day.

Furthermore, indoor coverage for mobile telephone systems may be particularly in windowless spaces. The present invention also provides an improvement in existing wireless transmission systems that do not utilize active intermediate systems.

The connection mechanism may be a data cable with standard electric contacts for mounting base connections, soldered for the integrated connection of the host unit 10, adapters for direct, integrated, connection to a host unit 10, and so on. Apparatus 12 may thus also be integrated in a host unit in a manner known to the skilled person, via connection mechanism 14. The direct communication link 9 is intended for the transmission of data between the apparatuses 12, as indicated by the unidirectional arrows in Fig. 1. The distance between the apparatuses 12 may vary between about 0.5 m to several 100 meters, indicated by the two-directional arrows in Fig. 1. The apparatuses 12 need not necessarily be directly visible to one another, and reflectors (not shown), mirrors or other reflective surfaces may be used to reflect light, radio waves, ultrasonic signals, etc.

The wireless transmitter units may be directed more or less divergently adapted or omnidirectional.

Communication between the apparatuses 12 may be two-directional or unidirectional in both directions, such as duplex, full duplex and simplex communication.

The two apparatuses 12 both transmit and receive data in pulse form, such as light, radio or ultrasonic pulses, depending on the wireless transmission technique used. Although infrared light (IR light) is the most obvious choice with regard to light pulses, this does not exclude the use of other optical light transmitting techniques.

The apparatuses 12 are constructed to filter-out transmission disturbances and noise via an internal filtering program or via internal hardware, so that erroneous information will be sorted out or errors corrected. Such sorting and error corrections may be achieved with the aid of typical codes for the transmission of wireless digital data, for instance, employing known CRCs (Cyclic Redundancy Codes) for error-free transmission of received data to host units 10.

A host unit 10 may comprise a PC, another host computer, or communications units that include integrated processor-based electronics for communicating with other units. These communication units 10 are herewith able to maintain the transmission of information in a typical manner via cables or other connection means in, e.g., a network of units 10, wherein a connected arrangement 12 may be used for the intermittent transmission of data when so required. The intermittent use of a connected arrangement may be due to a number of reasons, for instance the transmission of data to another network, the replacement of modem transmission between freestanding PC units, the use of specific peripheral equipment control functions, etc.

The exchange of information between the external apparatuses 12 and host unit 10 through data cable 14 may be effected e.g., in a serial RS232 channel or some other suitable standard serial or parallel data channel. The cable 14 is connected between host unit 10 and arrangement 12 via one or more standard serial or parallel input and output ports (I/O ports).

Reference is now made to Fig. 2, which is a block schematic illustrating a communications link 9 having two apparatuses 12 for the wireless transmission of digital data in accordance with the present invention.

The inventive apparatuses 12 are comprised of integrated processor-based electronics and the central processor unit (CPU) 20 has integrated therein, a filter mechanism 26, software or hardware for data flow filtration, error correction and protocol handling. CPU 20 has a transmitter mechanism 22 connected to a receiver mechanism 24 via the filter mechanism 26. Naturally, the filter mechanism 26 may be a device located externally of the CPU and connected between said unit 20 and the receiver mechanism 24. The CPU is also connected to a signal conversion mechanism 28, which converts signals to a form intended for the transmission of data between apparatuses 12 and host units 10 respectively.

Although not shown, the CPU includes typically I/O ports for communication on a worldwide basis and to which the cable connection 14 is connected via an appropriate standard mounting base (not shown).

Units and means and the communication technology employed therebetween, this technology being included in the apparatuses 12, are well known in the present technical field and do not therefore need to be described in detail in order for one skilled in this art to practice the invention. On the other hand, the combination of means and units localized in apparatus 12 for an external host unit 10 is unique, wherein the host unit 10 in one embodiment greatly relieves time-consuming transmission and reception tasks that load interruption routines and context switching (data term for switching between working routines) for CPU-based host units 10, while these tasks are totally obviated in second embodiment. In a first embodiment of the invention, the apparatus 12 includes the filter mechanism 26 having a filtering protocol but lacks the communications protocols that host

units 10 usually communicate with externally. In other words, host units 10 require such protocols in order to satisfy the object of the invention.

Filtering mechanism 26 for filtering-out disturbing or interfering data constitutes an important part of the invention. It will be understood that a wireless host unit 10 which communicates in accordance, with present techniques is constantly required to interpret interference noise from apparatus in its surroundings, such as noise from TV remote controls, radio transmitting apparatus, e.g., mobile telephones, etc. This requires that the host unit 10 continuously interpret signals arriving at the receiver and determining whether the data is relevant data or interference data. An apparatus 12, which includes filter mechanism 26 for filtering-out disturbance data and interference data relieves a connected host unit 10 from such determinations, thereby allowing unit 10 to rest while awaiting the arrival of relevant, filtered data.

In another embodiment, apparatus 12 also includes the aforesaid communications protocols that a host unit 10, connected to apparatus 12, will normally include and which thus operates autonomously from concerned host unit 10 with respect to the data processing of transmission and reception signals.

Apparatus 12 according to the second embodiment, includes the protocol handling of data for known alphanumerical character codes with control characters. Thus, a host unit 10 is able to send and receive, via data cable 14, alphanumerical text files with control characters, e.g., ASCII characters, directly to/from the external arrangement without needing to process received data more than is required for internal data processing reasons.

As before described, host units 10 are still able to communicate via conventional network connections, wherein specific applications may enable parts of the network communication to take place via the external wireless communication arrangement 12 between host units 10 when necessary.

When a host unit 10 wishes to communicate with another host unit, information is sent, e.g., to the input port of said other host unit via a serial RS232 channel. The transmitting apparatus 12 converts the information arriving from its host unit 10 into a pulse train of electromagnetic signals, or in applicable cases into pulse trains of acoustic signals, and sends the pulse trains via the wireless link to a similar apparatus 12, which is intended to receive the transmitted signals. The received pulse trains arrive at the filter mechanism 26 via receiver 24; for filtration of interference and noise and for checking that the information is correct. Indeterminable information received is filtered-out and never reaches the host unit 10. In this regard, [?] two apparatuses 12 communicating with host units 10 have an internal data transmission protocol. The [?] modus operandi of the arrangements 12 is therefore unique and does not [?] incur additional load on the connected host units 10, wherein any additional work required for wireless data transmission is handled by the link 9 that includes the apparatuses 12.

When the apparatus 12 is constructed in accordance with the second alternative embodiment, the arrangement will preferably be portable and capable of being connected to a host unit 10 via the standard I/O ports of the host unit and the apparatus 12, without needing to supplement host unit 10 with wireless communication software.

It will be understood that the aforescribed embodiments are not intended to limit the scope of the present invention, but merely to illustrate exemplifying applications to one of normal skill in this particular technical field. Accordingly, the number of embodiments conceivable to one skilled in this art is only restricted by the scope of the following Claims.